

REMARKS

Applicants have carefully considered the points raised in the Office Action and believe that the Examiner's concerns have been addressed as described herein, thereby placing this case into condition for allowance, which is respectfully requested.

Status of the claims

Claims 1-51 are pending in the present application. Claims 25-27 and 37-41 were previously withdrawn from consideration as drawn to a non-elected invention in response to a restriction requirement, and claims 28-36 and 42-48 were withdrawn in response to an election of species requirement. Claims 1-24 and 49-51 are currently under consideration. Amendment and cancellation of certain claims is not to be construed as a dedication to the public of any of the subject matter of the claims as previously presented.

Applicants note that upon allowance of a generic claim, Applicants will be entitled to consideration of claims to additional species. Applicants reiterate the request that, upon the allowance of a generic claim, the remainder of the species of claims 28-36 and 42-48 be included as permitted under 37 C.F.R. §1.141(a).

With respect to any claim amendments or cancellations, Applicants have not dedicated to the public or abandoned any unclaimed subject matter and moreover have not acquiesced to any objections and/or rejections made by the Patent Office. Applicants expressly reserve the right to pursue prosecution of any presently excluded subject matter or claim embodiments in one or more future continuation and/or divisional application(s).

Request for rejoinder

Applicants previously made requests for rejoinder of withdrawn process claims in the responses filed on May 16, 2005 and November 18, 2005. In response, the Examiner states that he "respectfully disagrees with the applicants' request for rejoinder . . . as there are no product claims

in the withdrawn claims and the claims were elected without traverse.” Office Action, page 6, emphasis in original. Applicants do not understand the statement by the Examiner about there being “no product claims in the withdrawn claims,” because the request made by Applicants was with regard to rejoinder of withdrawn process claims, not product claims. Further, the statement made by the Examiner regarding the original election of claims without traverse is moot because there is no requirement that a request for rejoinder be made in the response to a restriction requirement.

As discussed in the response filed on November 18, 2005, MPEP §821.04 states that “[w]here product and process claims drawn to independent and distinct inventions are presented in the same application, applicant may be called upon under 35 U.S.C. 121 to elect claims to either the product or process. . . .[I]f applicant elects claims directed to the product, and a product claim is subsequently found allowable, withdrawn process claims which depend from or otherwise include all the limitations of the allowable product claim will be rejoined” (Emphasis added.) The withdrawn method (*i.e.*, process) claims in this application are dependent on the elected apparatus (*i.e.*, product) claims, thus satisfying the conditions set forth under MPEP §821.04 for rejoinder upon allowance of the apparatus claims. The MPEP states that under these conditions, the process claims will be rejoined. The Examiner does not have the discretion to deny the Applicants’ request for rejoinder if the product claims are allowable and the process claims depend from the product claims.

With regard to the Examiner’s statement that the election of claims in response to the restriction requirement was made without traverse, MPEP §821.04 does not state a time frame during which a request for rejoinder of non-elected process claims must be made. The MPEP simply states that the non-elected process claims will be rejoined when the elected product claims are found allowable, provided that the withdrawn process claims depend from or otherwise include all of the limitations of the allowable elected product claims. Applicants do not need to make such a request at the time of responding to the original restriction requirement. Withdrawn process claims that depend from or recite all of the limitations of elected product claims must be rejoined by the Office as a matter of right once the product claims are found to be allowable.

Applicants respectfully reiterate their request for rejoinder of withdrawn process claims 25-27 and 37-41 upon allowance of the product claims from which they depend.

Rejection under 35 U.S.C. §103(a)

Claims 1-24 and 49-51 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over any one of Hamada et al. (U.S. Patent No. 5,609,834; “Hamada”), Furuya et al. (JP 6-111838; “Furuya”), or Nakamura et al. (JP 6-219703; “Nakamura”), in view of Hunter et al. (U.S. Patent No. 4,214,867; “Hunter”). Applicants respectfully traverse this rejection.

Establishment of a *prima facie* case for obviousness requires, *inter alia*, that references when combined must teach or suggest all of the claim limitations and that there must be a suggestion or motivation in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify a reference or combine reference teachings. MPEP §2143. The combination of references used in the present rejection does not satisfy these criteria.

The combination of references cited in the rejection do not teach or suggest all of the claim limitations.

Neither Hamada, Furuya, or Nakamura teach all of the elements of the claimed invention. Hunter does teach the claim elements missing in Hamada, Furuya, or Nakamura.

Hamada teaches an apparatus in which reaction heat generated by an exothermic reaction is *indirectly* transferred to an endothermic reaction zone by transfer of exothermic reaction heat to a heat transfer zone *upstream* from the endothermic reaction zone, rather than *direct* transfer of reaction heat generated on an exothermic catalyst to an endothermic reaction catalyst through a conductive separator as claimed. Furuya teaches a reactor in which alternate channels have combustion or reforming catalyst coating the bottom and sides of a channel, with combustion heat generated in one channel *indirectly* transferred to a reforming catalyst through the gas phase in the next channel, rather than *direct* transfer of reaction heat generated on an exothermic catalyst to an endothermic reaction catalyst through a conductive separator as claimed. Neither Hamada nor

Furuya teach an apparatus in which a combustion reaction is in direct heat transfer contact with a reforming reaction, with exothermic and endothermic reaction catalysts directly opposite one another on opposing surfaces of a conductive corrugated separator as claimed. Nakamura does not teach an apparatus in which exothermic and endothermic reaction catalysts are on directly opposing surfaces of a conductive separator in which at least a portion of the separator is shaped to form corrugations comprising alternating ridges and grooves as claimed. With respect to claims 50 and 51, none of the cited references teaches an apparatus in which gas pressure in a combustion or reforming channel is higher than atmospheric pressure. Thus, none of these references teaches all of the elements of the current claims.

The Examiner has cited Hunter as allegedly supplying the missing elements not taught in the other references because Hunter mentions using a corrugated metal strip or foil as a separator (col. 2, line 48). Applicants respectfully disagree that Hunter provides the elements missing from Hamada, Furuya, and Nakamura.

As discussed above, neither Hamada nor Furuya teach an apparatus in which a combustion reaction is in direct heat transfer contact with a reforming reaction, with exothermic and endothermic reaction catalysts directly opposite one another on opposing surfaces of a conductive corrugated separator as claimed. Hunter does not teach these features. Hunter teaches a catalytic coating on one surface of a heat transfer membrane for catalysis of a combustion reaction, and transfer of the heat generated by the combustion reaction to a gas flowing on the other side of the membrane (see, e.g., col. 1, lines 32-46). Hunter does not teach exothermic and endothermic catalysts on opposite sides of a separator as claimed, and thus does not supply the elements missing from Hamada and Furuya, which also do not teach exothermic and endothermic catalysts on opposite sides of a separator.

As discussed above, Nakamura does not teach an apparatus in which exothermic and endothermic reaction catalysts are on directly opposing surfaces of a conductive separator in which at least a portion of the separator is shaped to form corrugations comprising alternating ridges and grooves as claimed. Hunter does not supply this feature that is missing in Nakamura because Hunter does not teach a separator containing exothermic and endothermic catalysts on opposite

sides of a separator. Hunter mentions a corrugated metal strip or foil, but this is in the context of a device that contains a catalytic coating for combustion on only one side of a separator, rather than exothermic and endothermic catalytic coatings on opposite sides of a separator as claimed. Hunter does not teach a corrugated separator having two opposing catalyst-coated surfaces as claimed.

As discussed above, with respect to claims 50 and 51, neither Hamada, Furuya, or Nakamura teaches an apparatus in which gas pressure in a combustion or reforming channel is higher than atmospheric pressure as claimed. Hunter also does not teach an apparatus in which gas pressure is higher than atmospheric pressure in a combustion or reforming channel, and thus does not supply the elements missing from the other cited references.

There is no suggestion or motivation to combine the cited references.

A *prima facie* case for obviousness requires, *inter alia*, that there must be a suggestion or motivation in the references themselves or in the knowledge generally available to one of ordinary skill in the art to combine reference teachings. MPEP §2143. “The mere fact that references can be combined does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.” MPEP §2143.01.III (citing *In re Mills*, 916 F.2d 680 (Fed. Cir. 1990). The references cited in the Office Action do not suggest the desirability of combining the teachings therein or provide motivation to arrive at the claimed invention.

The Examiner states that “Hunter et al. include the motivation to provide improved catalytic combustion and heat exchange for carrying out simultaneous reactions.” Office Action, page 7. Applicants respectfully disagree that Hunter provides motivation to modify Hamada, Furuya, or Nakamura to arrive at the claimed invention. Hunter does not teach use of an endothermic catalyst to catalyze an endothermic reaction, and thus does not provide motivation to provide an endothermic catalyst opposite an exothermic catalyst on a separator so that heat generated in an exothermic reaction may be directly transferred through the separator to provide heat for an endothermic reaction on the endothermic catalyst as claimed. The Examiner cites Hunter as providing the element of a corrugated separator. However, Hunter does not suggest modification of the corrugated strip or foil discussed therein to incorporate an endothermic catalyst opposite an

exothermic catalyst, because no endothermic catalyst is disclosed, and thus does not provide motivation to combine the references.

As discussed above, with respect to Hamada and Furuya, neither of these references teaches a device in which exothermic and endothermic catalysts are coated on opposing sides of a conductive corrugated separator. Hunter does not provide motivation for such a configuration. Since Hunter does not disclose use of an endothermic catalyst, this reference does not provide motivation to incorporate an endothermic catalyst-coated surface opposite an exothermic catalyst-coated surface on a corrugated separator, as required to modify the teachings of Hamada and Furuya to arrive at the presently claimed invention.

As discussed above, with respect to Nakamura, this reference does not teach exothermic and endothermic reaction catalysts on directly opposing surfaces of a conductive separator in which at least a portion of the separator is shaped to form corrugations comprising alternating ridges and grooves as claimed. Hunter does not provide motivation to modify the teachings of Nakamura to arrive at the claimed invention. Hunter does not disclose use of an endothermic catalyst and does not provide motivation to incorporate an endothermic catalyst-coated surface opposite an exothermic catalyst-coated surface on a corrugated separator.

Also as discussed above, with respect to claims 50 and 51, neither Hamada, Furuya, or Nakamura teaches an apparatus in which gas pressure in a combustion or reforming channel is higher than atmospheric pressure as claimed. Hunter does not provide motivation to arrive at such a configuration. Hunter does not teach a device with a channel in which gas pressure is higher than atmospheric pressure and does not provide motivation to modify the teachings of the other references to arrive at a device with this claimed feature.

In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a).

CONCLUSION

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing docket no. 220772007420. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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Respectfully submitted,

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